

Bulletin of the Museum of Comparative Zoology

AT HARVARD COLLEGE

VOL. 110, No. 6

ZOOLOGICAL RESULTS OF A FIFTH
EXPEDITION TO EAST AFRICA

VI

DECAPOD CRUSTACEA

By FENNER A. CHACE, JR.
U. S. National Museum

CAMBRIDGE, MASS., U. S. A.
PRINTED FOR THE MUSEUM
JULY, 1953

No. 6. — *Zoological Results*
of a *Fifth Expedition to East Africa*

VI

*Decapod Crustacea*¹

BY FENNER A. CHACE, JR.

U. S. National Museum

As might be expected of the first extensive collection of fresh-water crabs to be recorded from the highlands of Nyasaland, at least two of the five species collected by Mr. A. Loveridge apparently were previously undescribed. One of the remaining three forms is the rather striking *Potamon* (*Potamonautes*) *orbitospinus* Cunnington from Lake Nyasa. Another is a species which is tentatively identified as *P.* (*P.*) *hilgendorfi* (Pfeffer), previously recorded from various localities in Kenya Colony, Uganda, and Tanganyika Territory. The last species, which may be a third undescribed form, is represented by a single immature female. A list of the African fresh-water crabs is given in Chace, 1942.

Several authors have expressed regret at the tendency to propose new names for African potamonids on insufficient evidence and have suggested that the total number of species is likely to be considerably reduced when the variations of the valid forms can be correctly evaluated. There is certainly little excuse for describing as new a single immature or incomplete specimen, but to assign a specific name to material from an area far removed from the known range of that particular species, merely because the apparent differences are slight and may eventually be accounted for by normal variation, seems equally blameworthy. It is probable that the potamonid fauna of Africa, like other similar faunas, is made up of a few variable species with extensive ranges and a larger number of more or less isolated forms distinguishable by constant though relatively minor characters. The true picture will become clear only when good series of specimens of different ages, like those collected by Mr. Loveridge, become available from many localities throughout the African continent. It is usually a simple matter to synonymize names accompanied by adequate descriptions, once the limits of variation are determined, whereas it may be far more difficult to decide whether or not a lot of specimens assigned to a previously described species, with few or no comments, was correctly identified.

¹Published with permission of the Secretary of the Smithsonian Institution.

A few marine decapods collected by Mr. Loveridge at Port Sudan, Anglo-Egyptian Sudan; Dar es Salaam, Tanganyika Territory; and Beira, Mozambique, are included in this report for the locality records.

PAGURIDAE

CALCINUS LAEVIMANUS (Randall)

Pagurus tibicen Milne Edwards. H., 1837, p. 229. Not *Cancer tibicen* Herbst, 1791.

Pagurus laevimanus Randall, 1840, p. 135.

Calcinus tibicen Dana, 1852, p. 457.

Calcinus herbstii de Man, 1888, p. 437.

Calcinus herbstii Alcock, 1905, p. 53, pl. 5, fig. 4.

Calcinus laevimanus Rathbun, in Stimpson, 1907, p. 208 (footnote).

1 specimen (M.C.Z. 12600). Dar es Salaam, Tanganyika Territory.
13. vii. 48.

The name of this common hermit crab has caused considerable difference of opinion. Most recent authors have followed Alcock's example in accepting de Man's name. The latter was based on the contention that Randall's description does not fit the species in question inasmuch as it refers to the *right* hand as being very large. It seems obvious, however, that this was an error in the description, for no other Hawaiian pagurid fits Randall's species. Comparison of East African and Hawaiian material leaves little doubt that the same form is involved in both localities, and I therefore prefer to accept Miss Rathbun's decision regarding the valid name.

COENOBITIDAE

COENOBITA RUGOSUS H. Milne Edwards

3 ovigerous ♀♀ (M.C.Z. 12601; U.S.N.M. 91157). Port Sudan,
Anglo-Egyptian Sudan. 23. vi. 48.

CALAPPIDAE

MATUTA LUNARIS (Forskål)

Cancer lunaris Forskål, 1775, p. 91.

Matuta victor Alcock, 1896, p. 160.

Matuta lunaris Stebbing, 1905, p. 54.

Matuta lunaris Ihle, 1918, p. 185.

1 ♀ (M.C.Z. 12602). Beira, Mozambique; mangrove swamp.
17. vii. 48.

PORTUNIDAE

PORTUNUS (PORTUNUS) PELAGICUS (Linnaeus)

Cancer pelagicus Linnaeus, 1758, p. 626.

Neptunus pelagicus Alcock, 1899, p. 34 (part).

1 ♂ 1 ovig. ♀ (M.C.Z. 12603). Dar es Salaam, Tanganyika Territory. 12. vii. 48.

POTAMONIDAE

POTAMON (POTAMONAUTES) ORBITOSPINUS Cunningham

Potamon (Potamonautes) orbitospinus Cunningham, 1907, p. 259, pl. 16, fig. 1.

Potamonautes orbitospinus Balss, 1936, p. 182, text-fig. 18.

1 ♀ (M.C.Z. 12604). Mtimbuka, 13 miles north of Fort Johnston, on southwest shore of Lake Nyasa, Nyasaland. ii. 49.

POTAMON (POTAMONAUTES) HILGENDORFI (Pfeffer)

Telphusa hilgendorfi Pfeffer, 1889, p. 32.

Potamon (Potamonautes) hilgendorfi Chace, 1942, p. 186.

26 ♂♂ 20 ♀♀ 4 juv. (M.C.Z. 12605; U.S.N.M. 91156). Matipa Forest, Misuku Mountains, Nyasaland. 1-16. x. 48.

1 ♂ 2 ♀♀ (M.C.Z. 12606). Nchisi Mountain, Nyasaland. 1-11. xii. 48.

The identity of these specimens with Pfeffer's species is by no means certain. Most of them are obviously immature; the only female with an abdomen nearly as broad as in the adult is one with a carapace breadth of 47.5 mm. from Nchisi Mountain. The largest male, from the same locality is only 37.5 mm. broad. The specimens agree reasonably well with two immature males received from the Hamburg Museum (Rathbun, 1933, p. 256); the only noticeable difference is that the penultimate abdominal segment in the males from the present collection is slightly shorter and broader than it is in those received from Hamburg. Whether or not this difference is significant or whether it represents merely a local variation can be determined only when additional adult specimens become available for study.

POTAMON (POTAMONAUTES) CHOLOËNSIS, sp. nov.

Text-figures 1 and 2

Type ♂ (M.C.Z. 12607). Cholo Mountain, Cholo District, Nyasa-

land. 9-26. iii. 49.

21 ♂♂ 28 ♀♀ (M.C.Z. 12608; U.S.N.M. 91158). Same data.

1 ovig. ♀ (M.C.Z. 12609). Zomba Plateau, Nyasaland. 2. xii. 48.

Carapace seven-tenths as long as broad, convex anteriorly, rather deeply areolated but nearly flat behind protogastric region. Branchial regions swollen laterally, extending beyond outer orbital angle by more than width of orbit in adults. Surface appearing smooth and polished to the naked eye, punctate and very finely granulate under a lens, with some larger granules between outer orbital angle and end of post-frontal crest; faint rugae extend inward from lateral margins. Post-frontal crest granulous, rather sharp, and not interrupted, but disappearing just before reaching lateral margins. H-shaped depression very deep. Cervical groove absent except for a short, faint extension of the H-shaped depression. Depression dividing posterior branchial region into two parts broad and shallow, but distinct. Front obscurely bilobate in dorsal view, slightly and nearly regularly convex in frontal view. Granulated frontal margin barely visible from above. Upper margin of orbit bulging slightly outward and nearly transverse. Outer orbital angle slightly broader than a right angle. Epibranchial tooth small and placed well behind end of post-frontal crest. Antero-lateral line faint behind epibranchial tooth and curving inward; branchial regions bulging beyond it at widest part of carapace in adult males.

Chelipeds very unequal, fingers gaping, widely so in major chela of adult specimens. Merus with a row of denticles and one large tooth on anterior margin. Carpus with two sharp teeth, the anterior the larger. Walking legs moderately long; the second one on the left side of the holotype is regenerating, but in the paratypes this leg is approximately twice as long as the carapace.

Abdomen of male with sixth somite less than half as long as basal width. Terminal somite about two-thirds as long as basal width and noticeably constricted laterally. Extremities of first abdominal appendages of male turned obliquely outward. Anterior transverse sternal groove well marked and deep but becoming abruptly narrower and shallower at lateral margins of sternum. Posterior groove deep laterally, indistinct but continuous medially.

Outer maxillipeds smooth and punctate, without an ischial groove; exopod provided with a well developed, setose palp. Mandibular palp two-jointed, the terminal joint simple.

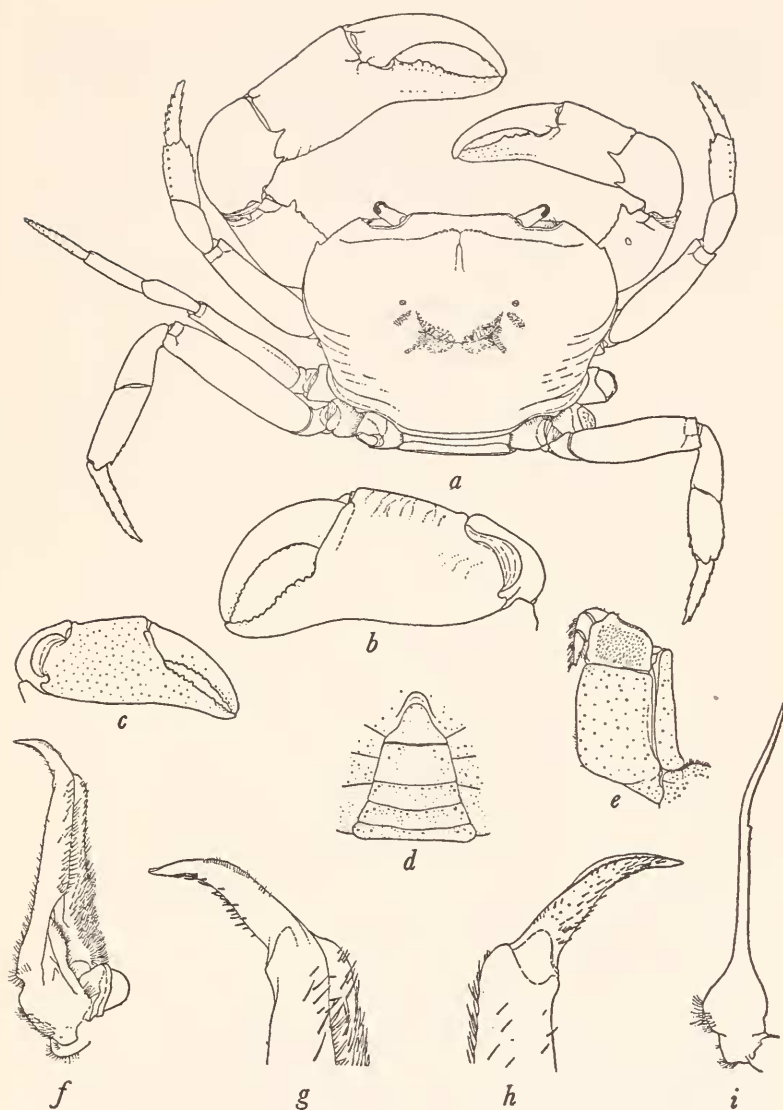


Fig. 1. *Potamon (Potamonautes) choloënsis*, male holotype; a, dorsal view, x 1; b, major chela, x 1; c, minor chela, x 1; d, abdomen, x 1; e, outer maxilliped, x 2; f, posterior view of tip of first right abdominal appendage, x 4; g, postero-medial view of tip of same, x 10; h, anterolateral view of tip of same, x 10; i, posterior view of second right abdominal appendage, x 4.

Measurements. Male holotype, length of carapace 29.8 mm., breadth 41.6 mm., distance between outer orbital angles 26.9 mm., breadth of front measured between inner suborbital angles 13.3 mm. Measurements for all of the intact specimens are shown in figure 2; females with a carapace length of more than 20 mm. usually have the carapace slightly narrower than males of the same size because of the less swollen branchial regions in females, but there were no other significant sexual differences.

As usual in this genus, there is some variation with sex and age. In large males, as noted above, the branchial regions extend laterally beyond the lateral line at the widest part of the carapace; this is not true of females. Most of the increased proportionate width in large specimens is due to lateral expansion beyond the orbits; in males with a carapace length of less than 22 mm., and in slightly larger females, the lateral expansion beyond the orbits is less than the orbital width. In young specimens the carapace is much flatter than in adults and the lateral line and branchial rugae are much more pronounced. Only in males with a carapace length of more than 26 mm. are the fingers of the major chela as widely gaping as in the type. In smaller males and in adult females, the movable finger is not markedly arched, and in specimens with a carapace length of less than 14 mm. the chelae are nearly subequal and the fingers meet throughout most of their length. Males with a carapace length of about 14 mm. have the first abdominal appendages somewhat reduced and the tips straighter than in adults; in still smaller specimens these appendages are much reduced and quite straight. The smallest male has a carapace length of 9.8 mm.; the first pleopods are very rudimentary in this specimen. In females with a carapace length of more than 23 mm. the abdomen is fully developed; it is somewhat narrower, but still rounded, in specimens with carapace lengths of 21 to 23 mm.; but at a carapace length of 20 mm. or less the abdomen has the juvenile subtriangular form.

From the species which seem to be most closely allied to it, *P. choloënsis* may be distinguished as follows. It is a larger species than *P. ballayi* (A. Milne Edwards, 1886) from the Congo and has the carapace less convex anteroposteriorly, the second tooth on the carpus of the chelipeds larger, and the first abdominal appendages of the male very different. It is somewhat smaller than *P. bayonianus* (Capello, 1864) from Angola, has a less prominent epibranchial tooth, and 2 sharp teeth rather than a tooth and a lobe on the carpus of the chelipeds. From *P. biballensis* Rathbun, 1905, from Angola it differs in

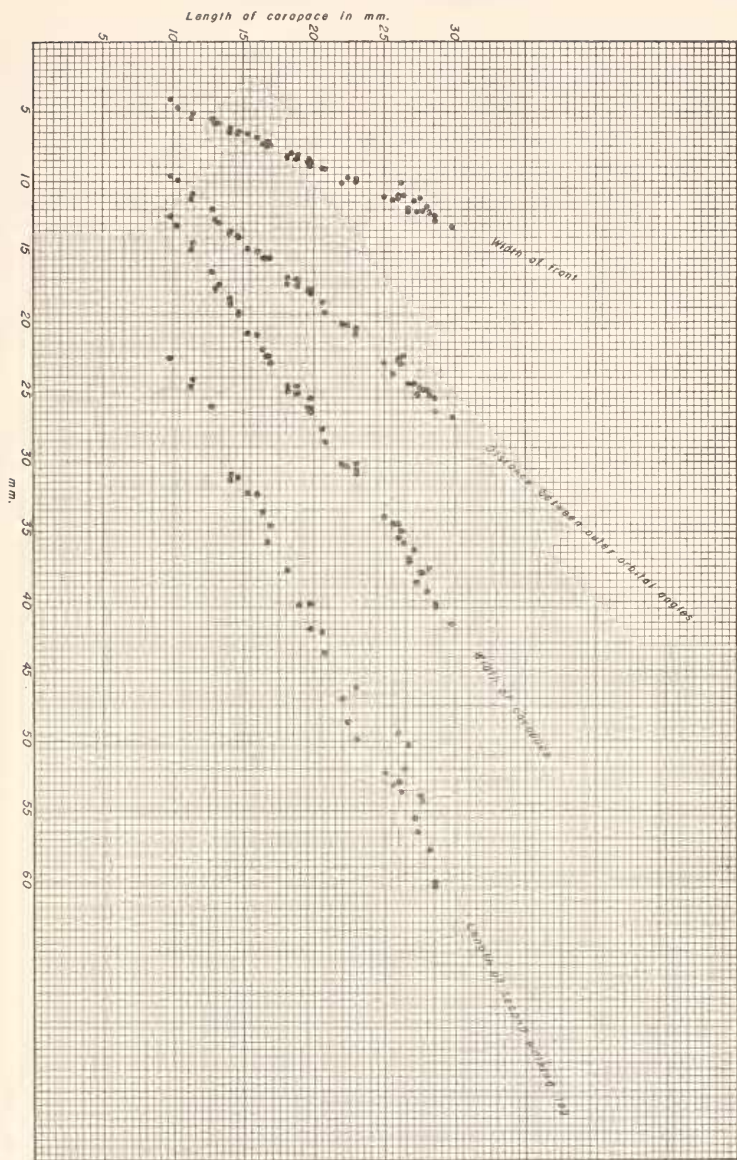


Fig. 2. Variation with growth in *Potamon (Potamonautes) chlotčensis*.

having the post-frontal crest less straight and the epibranchial tooth not reaching nearly to the level of the orbit. It is distinguished from *P. bombetokensis* Rathbun, 1904, from Madagascar by the less convex carapace, obtuse outer orbital tooth, less advanced epibranchial tooth, and the shorter and broader sixth abdominal somite of the male. From *P. bottegoi* de Man, 1898, it differs in the much less convex carapace, obtuse outer orbital angle, and much more constricted terminal abdominal somite in the male. From *P. calcaratum* Gordon, 1929, from the Lower Zambezi Valley, Mozambique, it differs in having the carapace less convex and more swollen laterally, the outer orbital angle obtuse, the chelipeds and legs more slender, the last abdominal somite of the male constricted, and the male abdominal appendages very different. The more obtuse outer orbital angles, the less advanced epibranchial tooth, and the much more expanded branchial regions distinguish it from *P. capelloanus* Rathbun, 1905, from Angola. It has the outer orbital and epibranchial teeth less prominent and less acute and the frontal margin less deeply bilobate than has *P. dubius* (Capello, 1873) from Angola. *P. choloënsis* appears to correspond closely with the description of *P. dubius jallae* (Nobili, 1896) from northern Rhodesia, but comparison with a cotype of that species in the collections of the U. S. National Museum discloses that the carapace of *P. choloënsis* is broader and more depressed centrally, the outer orbital angle is not acute, the epibranchial tooth is smaller, and the sixth abdominal somite of the male much broader. It has the branchial regions more swollen and the epibranchial tooth set farther back than in *P. dybowskii* Rathbun, 1904, from French Equatorial Africa. It differs from *P. coorssei* Marchand, 1902, in having the branchial regions expanded farther laterally and in having the sixth abdominal somite of the male somewhat broader.

POTAMON (POTAMONAUTES), sp. ?

1 ♀ (M.C.Z. 12610). Nyika Plateau above Nchenachena, Nyasaland. S. xi. 48.

This single specimen has the carapace 18.4 mm. long and 25.0 mm. broad, the distance between the outer orbital angles 16.5 mm., the front between the inner suborbital angles 7.3 mm. broad, and the second walking leg 38.4 mm. long, measured from the coxal articulation with the sternum. It appears to be a slightly smaller species than *P. hilgendorfi* (Pfeffer, 1889), for the abdomen is narrowly oval rather

than subtriangular as in females of *P. hilgendorfi* of similar size. It also differs from that species in having the post-frontal crest turned backward and narrowly interrupted just before reaching the lateral margin, in having the front and the distance between the outer orbital angles shorter, and the outer orbital angles slightly less than rectangular, rather than obtuse as in *P. hilgendorfi*. The slope of the outer ends of the post-frontal crest suggests a relationship with *P. platynotus* Cunningham, 1907, from Lake Tanganyika, but the present specimen does not have the spooned fingers characteristic of that species.

POTAMON (POTAMONAUTES) MONTIVAGUS, sp. nov.

Text-figures 3 and 4

- Type ♂ (M.C.Z. 12611). Cholo Mountain, Cholo District, Nyasaland. 9-26. iii. 49.
- 6 ♂♂ 6 ♀♀ 1 juv. (M.C.Z. 12612; U.S.N.M. 91160). Same data.
- 1 yng. ♂ 1 yng. ♀ (M.C.Z. 12613). Likabula River, Mlanje Mountain, Nyasaland. 27-31. vii. 48.
- 10 ♂♂ 6 ♀♀ 1 juv. (M.C.Z. 12614). Ruo River, Mlanje Mountain, Nyasaland. 1-9. iv. 49.
- 12 ♂♂ 15 ♀♀ 7 juv. (M.C.Z. 12615; U.S.N.M. 91159). Chiradzulu Mountain, near Blantyre, Nyasaland. 25-31. viii. 48.
- 1 ♂ 1 ♀ (M.C.Z. 12616). Zomba Plateau, Nyasaland. 2. ix. 48.
- 1 ovig. ♀ (M.C.Z. 12617). Dedza, at base of Dedza Mountain, Nyasaland. 21. xii. 48.
- 6 ♂♂ 7 ♀♀ (M.C.Z. 12618; U.S.N.M. 91155). Nchisi Mountain, Nyasaland. 1-11. xii. 48.
- 1 ovig. ♀ (M.C.Z. 12619). Chitala River, near Salima, Nyasaland. 14. xii. 48.
- 1 ovig. ♀ (M.C.Z. 12620). Nchenachena, northern Nyasaland. 23. x. 48.

Carapace slightly more than two-thirds as long as broad in adults, convex in both directions on anterior portion, flatter posteriorly. Branchial regions usually swollen laterally beyond outer orbital angles by more than width of orbits in adults. Surface punctate to the naked eye and faintly striate anterolaterally. Post-frontal crest rather sharp and high, continuous from midline to lateral margins, faintly granulous medially becoming more distinctly so laterally; it is concave forward throughout its length, except for a slight convexity behind the retracted cornea, and is situated rather far forward, nearly attaining the

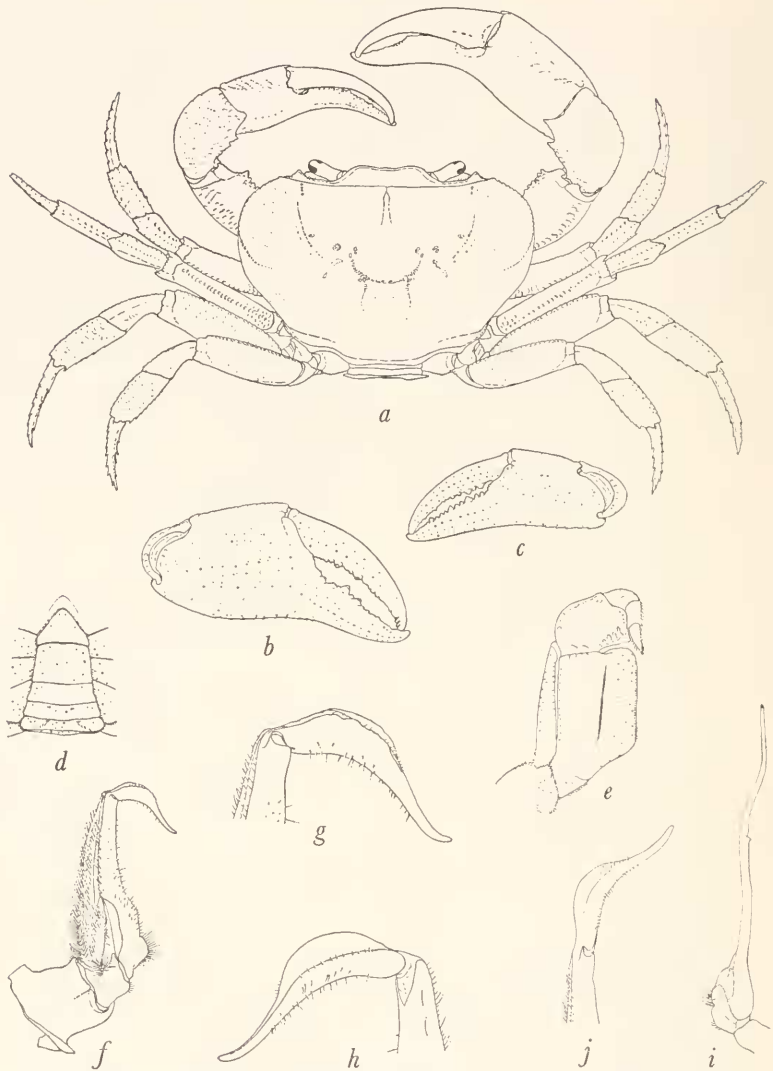


Fig. 3. *Potamon (Potamonautes) montivagus*; a, dorsal view of male holotype x 0.6; b, major chela of holotype, x 0.6; c, minor chela of holotype, x 0.6; d, abdomen of holotype, x 0.6; e, outer maxilliped of holotype, x 1.5; f, posterior view of first left abdominal appendage of holotype, x 2.0; g, posterior view of tip of same, x 5.0; h, anterior view of tip of same, x 5.0; i, posterior view of second right abdominal appendage of holotype, x 2.0; j, posterior view of distal end of first left abdominal appendage of male paratype with a carapace length of 27.5 mm., x 5.0.

level of the orbital margins in dorsal view. There is a depression followed by a slight swelling in the deep groove in front of the crest just beyond the tip of the retracted eye. H-shaped depression well-marked. Cervical groove faintly perceptible anteriorly where it meets the post-frontal crest behind the outer orbital angles. Depression dividing the posterior branchial region broad and indistinct. Front obscurely trilobate in dorsal view, regularly convex in frontal view. Frontal margin typically visible from above. Upper margin of orbit nearly straight and trending obliquely forward. Outer orbital angle subrectangular. There is a broadly obtuse angle formed where the anterolateral margin turns outward toward the end of the post-frontal crest. No epibranchial tooth. Anterolateral line made up of granules and becoming very faint posteriorly as it curves inward onto the branchial region; the side wall of the latter extends noticeably beyond the lateral line at the widest part of the carapace in adult males, much less so in females.

Chelipeds unequal, fingers gaping moderately in major chela, very slightly in minor one. Merus with a row of tubercles, one of them dentiform, on anterior margin. Carpus with two sharp teeth, the anterior the larger. Walking legs rather long, the second, measured from the coxal articulation with the sternum, typically about twice as long as carapace.

Abdomen of male with sixth somite a little more than two-thirds as long as its basal width, the lateral margins slightly concave proximally. Terminal somite about two-thirds as long as broad, its proximal margin slightly longer than opposing margin of sixth somite. Anterior transverse sternal groove very deep. Posterior groove very deep laterally, indistinct medially, in very large specimens, indistinct throughout in smaller ones.

Outer maxillipeds with a deep ischial groove placed nearer inner than outer margin. Exopod provided with a small palp. Mandibular palp two-jointed, the terminal joint simple and hidden behind the mandible.

Measurements. Male holotype, length of carapace 43.8 mm., breadth 65.3 mm., distance between outer orbital angles 38.6 mm., breadth of front measured between suborbital angles 17.1 mm., length of second walking leg 85.1 mm. Comparable measurements for all of the intact specimens examined are shown in figure 4; no significant differences between the proportions of males and females could be found.

As usual in this family, there is considerable variation with size. In

young specimens the anterolateral marginal line on the carapace is much more prominent, causing the carapace to appear less convex; the anterolateral regions are also considerably more rugose. It can be determined from figure 4 that only in specimens with a carapace length of more than about 35 mm. do the branchial regions extend laterally beyond the outer orbital angles by more than the width of the orbit. In very small specimens there is no trace of the low median lobe on the frontal margin, and the front therefore appears bilobate rather than trilobate in dorsal view. Only in the holotype, the largest specimen in the collection, are the ends of the first pleopods of the male turned outward at an angle of 90° or more; the ends are more or less oblique in males with carapace lengths from 22 to 40 mm., nearly straight from about 15 to 21 mm., somewhat convergent from about 12 to 15 mm., and short and straight between 10 and 12 mm. The smallest recognizable male has a carapace length of 9.4 mm. and has the first pleopods barely discernible. The abdomen in females is fully developed only in specimens with a carapace length of more than 30 mm., narrowly oval between 20 and 30 mm., and triangular in smaller specimens. The three ovigerous specimens (none of them typical) have carapace lengths of 30.4, 35.8, and 37.9 mm.

The specimens from Dedza, Nchenachena, Nchisi Mountain, and the Chitala River are somewhat aberrant. The single dried ovigerous female from Dedza has the mesogastric groove hardly tectiform and the post-frontal crest distinctly convex forward so that it partially hides the orbital margin in dorsal view. The ovigerous female from Nchenachena, the lot of six males and seven females from Nchisi Mountain, and the ovigerous female from the Chitala River have the post-frontal crest typical, but the mesogastric groove is gradually divergent posteriorly rather than tectiform, the branchial regions more inflated, the frontal margin invisible in dorsal view, and the walking legs shorter, the second leg being little more than one and three-fourths as long as the carapace rather than about twice as long, as in the typical form. These specimens are indicated by open circles in figure 4. Although some of these specimens have a different appearance from the typical ones, it does not seem advisable to designate them as a distinct subspecies at this time.

There can be no assurance that this form is specifically distinct from all previously described species, but it appears to be distinguishable from the following species which seem to be most closely allied to it. It differs from *P. ambiguus* Rathbun, 1904, from Mount Kilimanjaro,

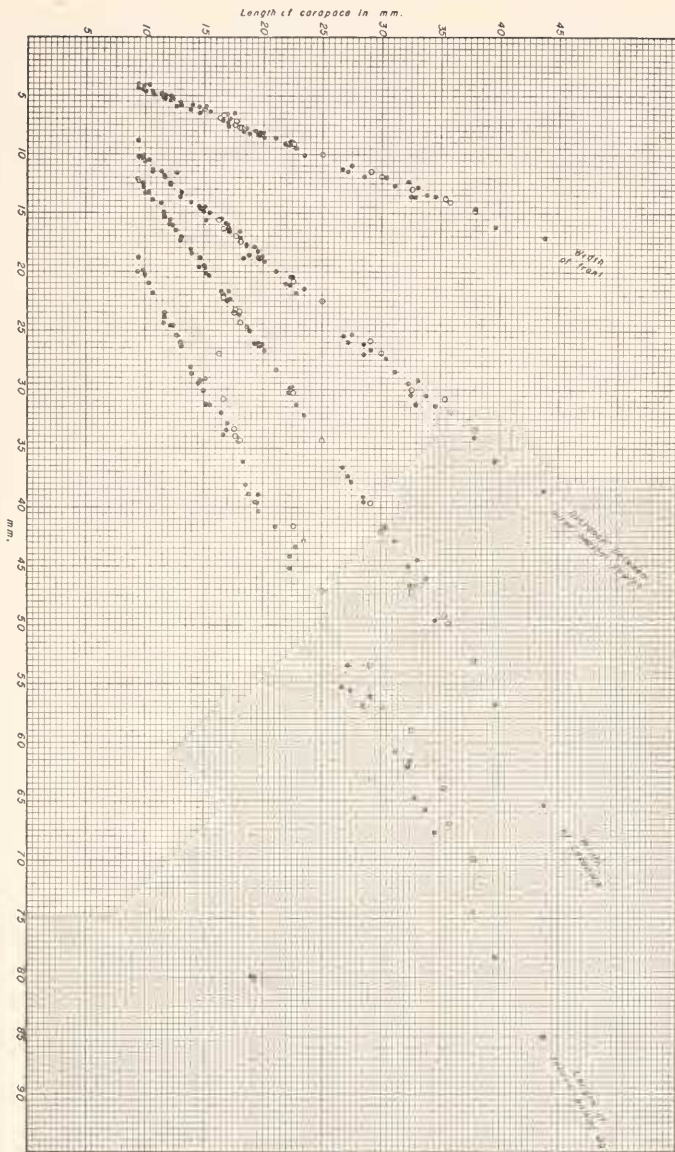


Fig. 4. Variation with growth in *Potamon (Potamonectes) montivagus*. Open circles indicate measurements of specimens from Nchenachena, Nchisi Mountain, and the Chitala River.

Tanganyika Territory, and the Taita Mountains and Kibwezi, Kenya Colony, in the more concave and less oblique post-frontal crest, the tectiform mesogastric groove, the shallower gastro-cardiac furrow, and the much more prominent ischial groove on the outer maxillipeds. From *P. inflatus* (H. Milne Edwards, 1853) from Natal it is distinguished by the narrower front, less sinuous post-frontal crest, and less inflated branchial regions. It is apparently a larger species than *P. infravallatus* (Hilgendorf, 1898) from the Usambara Mountains, Tanganyika Territory, and it lacks the sternal swellings at the bases of the chelipeds characteristic of that species. It is also larger than *P. johnstoni unisulcatus* Rathbun, 1933, from the Uluguru Mountains, Tanganyika Territory, and the carapace is more convex and the post-frontal crest more concave. The carapace of *P. montivagus* is less convex, the branchial regions much less swollen, and the front less vertical than in *P. loveridgei* Rathbun, 1933, from Ujiji, Tanganyika Territory. It is somewhat larger than *P. luboensis* Rathbun, 1904, from the Belgian Congo and the carapace is less inflated, the legs shorter and stouter, and the ischial groove on the outer maxillipeds much more pronounced. From *P. perlatus* (H. Milne Edwards, 1837) from the Cape of Good Hope it differs in having the carapace less convex, the post-frontal crest curved forward laterally rather than straight and oblique, the H-shaped depression deeper, the front distinctly narrower, and the legs stouter. It is a larger species than *P. reguieri* Rathbun, 1904, from the French Congo and it has a distinct mesogastric groove, more concave post-frontal crest, and stouter legs. It appears to be very near *P. reichardi* (Hilgendorf, 1898) from Tanganyika Territory but it is apparently larger, the branchial regions are typically less swollen, the legs more robust, the penultimate somite of the male abdomen slightly longer, and the male pleopods different in specimens of comparable size. *P. rodolphianus* Rathbun, 1909, from south of Lake Rudolf, Kenya Colony, is based on juvenile specimens which are too young to furnish adequate characters. *P. montivagus* might easily be confused with *P. rothschildi* Rathbun, 1909, from Kenya Colony but it is apparently distinguished from that species by the much deeper ischial groove on the outer maxillipeds, the less gaping fingers on the major chela, and the less spinous carpal and propodal joints of the walking legs. From *P. sidneyi* Rathbun, 1904, from Natal it may be separated by the more convex post-frontal crest and the very different male pleopods. It is a larger species than *P. stanleyensis* Rathbun, 1921, from the Belgian Congo and it has the carapace less

convex longitudinally, the post-frontal crest more convex and less oblique, no strong denticle behind the second carpal tooth on the chelipeds, and the legs more robust. Finally, although it superficially resembles *P. usambarae* Rathbun, 1933, from the Usambara Mountains, Tanganyika Territory, *P. montivagus* is a much larger species and it has a broader front which is not distinctly bilobate, and very different male pleopods.

GRAPSIDAE

SESARMA (*SESARMA*) *MEINERTI* de Man

Sesarma meinerti de Man, 1887, pp. 648, 668.

Sesarma (*Sesarma s.s.*) *meinerti* Tesch, 1917, pp. 171, 246 (synonymy).

Sesarma meinerti Cott, 1930, pp. 679-692, text-figs. 1-4, pl. 1.

1 ♂ (M.C.Z. 12621). Beira, Mozambique. 17. vii. 48.

Cott has given an interesting account of the habits and protective coloration of this species at Beira.

BIBLIOGRAPHY

ALCOCK, A.

1896. Materials for a carcinological fauna of India. No. 2. The Brachyura Oxystoma. Jour. Asiatic Soc. Bengal, **65**, pt. 2, pp. 134-296, pls. 6-8.

1899. Materials for a carcinological fauna of India. No. 4. The Brachyura Cyclometopa. Part II. The families Portunidae, Cancridae and Corystidae. Jour. Asiatic Soc. Bengal, **68**, pt. 2, No. 1, pp. 1-104.

1905. Catalogue of the Indian decapod Crustacea in the collection of the Indian Museum. Part II. Anomura. Fasciculus I. Pagurides. Calcutta, pp. i-xi, 1-197. pls. 1-16.

BALSS, H.

1936. Beiträge zur Kenntnis der Potamonidae (Süßwasserkrabben) des Kongogebietes. Rev. Zool. Bot. Afr., **28**, pp. 165-204, text-figs. 1-29.

CHACE, F. A., JR.

1942. Scientific results of a fourth expedition to forested areas in eastern Africa. III. Decapod Crustacea. Bull. Mus. Comp. Zool., **91**, pp. 185-233, text-figs. 1-10.

COTT, H. B.

1930. The Zoological Society's Expedition to the Zambesi, 1927: No. 2. Observations on the natural history of the land crab *Sesarma*

meinerti, from Beira, with special reference to the theory of warning colours. Proc. Zool. Soc., London, 1929, pp. 679-692, text-figs. 1-4, pl. 1.

CUNNINGTON, W. A.

1907. Zoological results of the Third Tanganyika Expedition, conducted by Dr. W. A. Cunnington, 1904-1905. — Report on the brachyurous Crustacea. Proc. Zool. Soc., London, 1907, pp. 258-276, text-fig. 84, pls. 16-17.

DANA, J. D.

1852. Crustacea (Part I). U. S. Exploring Expedition, **13**, pp. i-viii, 1-685.

FORSKÅL, P.

1775. Descriptiones animalium avium, amphibiorum, piscium, insectorum, vermium; quae in itinere orientali observavit. Copenhagen, pp. 1-140.

IHLE, J. E. W.

1918. Die Decapoda Brachyura der Siboga-Expedition. III. Oxy stomata: Calappidae, Leucosiidae, Raninidae. Siboga-Expeditie, monogr. 39b², pp. 159-322, text-figs. 78-148.

LINNAEUS, C.

1758. Systema naturae. Stockholm, ed. 10, **1**, pp. 1-824.

MAN, J. G. DE

1887. Uebersicht der indo-paeifischen Arten der Gattung *Sesarma* Say, nebst einer Kritik der von W. Hess und E. Nauck in den Jahren 1865 und 1880 beschriebenen Decapoden. Zool. Jahrb., Syst., **2**, pp. 639-722, pl. 17.

1888. Bericht über die im indischen Archipel von Dr. J. Brock gesammelten Decapoden und Stomatopoden. Arch. Naturgesch., **53** Jahrgang, pp. 215-600, pls. 7-22a.

MILNE EDWARDS, H.

1837. Histoire naturelle des Crustacés. Paris, **2**, pp. 1-531.

PFEFFER, G.

1889. Übersicht der von Herrn Dr. Franz Stuhlmann in Agypten, auf Sansibar und dem gegenüber liegenden Festlands gesammelten Reptilien, Amphibien, Fische, Mollusken und Krebse. Jahrb. hamburg. wiss. Anst., **6** Jahrgang, 1888, Zweite Hälfte, pp. 1-36.

RANDALL, J. W.

1840. Catalogue of the Crustacea brought by Thomas Nuttall and J. K.

Townsend, from the west coast of North America and the Sandwich Islands, with descriptions of such species as are apparently new, among which are included several species of different localities, previously existing in the collection of the Academy. Jour. Acad. Nat. Sci. Philad., 8, 1839, pp. 106-147, pls. 3-7.

RATHBUN, M. J.

1933. Reports on the Scientific Results of an Expedition to the Southwestern Highlands of Tanganyika Territory. V. Crabs. Bull. Mus. Comp. Zool., 75, pp. 249-260, pls. i-vii.

STEBBING, T. R. R.

1905. South African Crustacea. Part II. Mar. Invests. Afr., 4, pp. 21-123, pls. 17-26.

STIMPSON, W.

1907. Report on the Crustacea (Brachyura and Anomura) collected by the North Pacific Exploring Expedition, 1853-1856. Smithson. Misc. Coll., 49, pp. 1-240, pls. 1-26.

TESCH, J. J.

1917. Synopsis of the genera *Sesarma*, *Metasesarma*, *Sarmatium* and *Clitocoeloma*, with a key to the determination of the Indo-Pacific species. Zoöl. Meded., 3, pp. 127-260, pls. 15-17.